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THE QUALITY OF COMMERCIAL CREAM OF TARTAR.

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Read before the Academy, at Topeka, December 30, 1904.

CREAM OF TARTAR, or potassium bitartrate, as it is scientifically termed, is derived wholly from the vegetable kingdom, and almost entirely from grapes. In this fruit it abounds, particularly in the vicinity of the seeds, and is the principal cause of the tart taste noticeable in that region. When the juice of the grape is expressed in wine-making, it carries with it the potassium bitartrate. This latter, since it is very much more soluble in the "must" than it is in the wine, is slowly precipitated, as the fermentation proceeds, along with large quantities of coloring matter and other substances.

From these precipitates, which are known, according to whether they collect on the sides or the bottoms of the fermenting tanks, as "argols" and "lees," respectively, the tartar is extracted with boiling water and purified by recrystallization. The chief natural impurity is calcium tartrate, which is present in the argols to the extent of from two per cent. to twenty per cent., but, owing to its very sparing solubility in water, should be practically all removed during the purification. Sometimes traces of the heavy metals are found, due to contamination from the vessels in which the argols are purified, but these are rigidly excluded by the tests of the United States Pharmacopœia, so that one per cent. of impurity which is allowed is practically calcium tartrate and moisture. According to the food and drug laws of Kansas (Gen. Stat. 1901, ch. 31, art. 11, page 487), the pure article of the United States Pharmacopœia is the only grade of cream of tartar that can be legally sold in the state.

As a drug, potassium bitartrate is classed with the saline cathartics and, owing to its hydragogue properties, is much used in dropsy. Aside from this, large quantities are used in combination with sodium bicarbonate as a leavening agent, or baking-powder. Its acid properties and sparing solubility in water render it peculiarly fitted for this purpose. The only drawback which, perhaps more than any other, keeps it from coming into universal use is that of price—a good cream of tartar baking-powder has for many years retailed at the uniform price of fifty cents per pound. It is, however, possible*, with pure

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* The following simple formula will be found to give satisfactory results, when pure chemicals are used:

Cream of tartar	2 parts.
Sodium bicarbonate	1 part.
Corn-starch or flour	1 part.

These ingredients must be dry, finely powdered, and free from lumps. Intimately mix, and pass several times through a fine sieve. Keep in a tightly closed can.

chemicals, for the housewife to prepare for herself this superior type of baking-powder at a cost of from twenty-five to thirty-five cents per pound—the usual price asked for the cheaper grades. No doubt many are prevented from availing themselves of this opportunity by the fact that cream of tartar is pretty generally believed to be grossly adulterated. To ascertain to what extent the facts bear out this belief has been the aim of this investigation. The work has been carried on in the laboratories of the University of Kansas School of Pharmacy during the past year, and special credit is due the members of the pharmacy class of 1904 for their valuable assistance in cooperating in the work.

The samples were all collected in one representative city in Kansas—one sample from each place of business. If the following statement of results does not represent the exact status of the quality of commercial cream of tartar in Kansas, it unquestionably does in one particular city.

In column I of the subjoined tabular statement of results will be found the number of samples analyzed; in column II, the source of the sample; in column III, the acidity in terms of pure potassium bitartrate, upon which its value as an agent for liberating carbon dioxide from carbonates depends; in column IV, the retail price per pound; in column V, the number of pounds calculated to equal, in efficiency, one pound of pure cream of tartar; the retail price of this is set opposite, in column VI; in column VII, the general observations.

I.	II.	III.	IV.	V.	VI.	VII.
		Per cent.				
6	Drug-store.........	99 +	$0.60	1.0	$0.60	Considered as up to standard.
2	"	99 +	.50	1.0	.50	" "
1	Grocery store......	99 +	1.25	1.0	1.25	" "
1	"	99 +	.80	1.0	.80	" "
1	"	99 +	.75	1.0	.75	" "
1	"	99 +	.60	1.0	.60	" "
4	"	99 +	.50	1.0	.50	" "
5	"	99 +	.40	1.0	.40	" "
2	"	99 +	.35	1.0	.35	" "
1	"	84	.50	1.2	.60	Calcium acid phosphate, etc.
1	"	84	.40	1.2	.48	Calcium acid phosphate, etc., with a trace of cream of tartar.
1	"	83	.60	1.2+	.72	Calcium acid phosphate, etc., with a trace of cream of tartar.
1	"	83	.50	1.2+	.60	Calcium acid phosphate, etc., with a trace of cream of tartar.
1	"	68	.40	1.5—	.59	Calcium acid phosphate, etc.
1	"	66	.40	1.5+	.61	" "
1	"	62	.75	1.6	1.20	" "
1	"	62	.40	1.6	.65	" "
1	"	62	.35	1.6	.56	" "
1	"	60	.60	1.6+	1.00	Calcium acid phosphate, etc., with a trace of cream of tartar.
1	"	14	.50	7.2	3.57	Calcium acid phosphate, etc.
1	"	14	.40	7.2	2.86	" "
1	"	12	.60	8 2+	5.00	" "

Thirty-six samples were examined; eight were obtained from druggists and twenty-eight from grocers. An inspection of the table brings out the following facts:

First. That all of the druggists were selling pure cream of tartar.

Second. That thirteen of the twenty-eight grocers were selling a substitute for cream of tartar, at a price equaling that asked for the pure article. Only four of these inferior samples contained any cream of tartar whatever, and this was more than likely accidental, since it existed in very small quantities.

Third. That seven of the fifteen grocers supplying pure cream of tartar were selling it at a price which was practically less than cost.

Fourth. That the adulteration, or more accurately speaking the substitution, was in every case calcium acid phosphate with its accompanying impurities, which in three of the samples was almost entirely impurity, calcium sulphate.

The calcium acid phosphate used for replacing the more expensive cream of tartar in leavening mixtures is a superior grade of superphosphate, a highly valued fertilizer, mixed with corn-starch. The better grades are pure white, and consist of the phosphates of calcium with about fifty per cent. of corn-starch and calcium sulphate, together with small quantities of iron and aluminum salts. As this complex mixture was the only impurity found, it is evident that any of these spurious samples would be condemned at once by their solubility, since a good sample of cream of tartar will be readily soluble in about fifty parts of hot water.

When such a simple test as this will serve to detect an adulteration, it does not seem that these dealers can be overly anxious to supply a pure article, and it is not necessary to look far for the motive for this high percentage of adulteration, since a much higher grade of this calcium acid phosphate than found in any of these samples masquerading under the guise of cream of tartar can be purchased for about one-fourth the price of pure cream of tartar. The public will, in many instances, be greatly imposed upon should it attempt an indiscriminate purchase of this article, and it is time that the attention of the wholesale as well as the retail grocers be called to paragraphs 2323 and 2327 of the Kansas statutes:

> Paragraph 2323. *Adulteration of Food and Drugs.* No person shall within this state manufacture for sale, offer for sale, or sell, any drug or article of food which is adulterated within the meaning of this act.
>
> Paragraph 2327. *Penalty.* . . . Whoever violates any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction shall be fined not exceeding $100 nor less than $25, or imprisonment not exceeding 100 days nor less than 30 days, or both.